FAQ Evita 4 / 2 dura

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Questions and Answers

Q 1. Is there an alternative trigger criteria next to the Flowtrigger in Neonatal Range and what is it?

A 1. Yes there is. In neonatal range it is 1 ml Volume

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Q 2. How does the safety network in the Evita ventilator series work in principle?

A 2. There are three independent working CPU systems working in the major components (main electronics, front and pneumatics) Each of them focussing on special tasks. This CPU architecture enables the ventilator to do a lot of simultaneously tasks and be cross-checked by the other CPU's to verify every operation cycle. An Error code message is displayed in case of a recognized occurrence.

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Q 3. What kind of data could be communicated to external devices?

A 3. Numeric data like monitoring and setting values could be read and/or printed out during ventilation performance for external documentation. As a standard feature the Evita series is equipped with a serial RS 232 interface which supports different communication protocols. The standardized MEDIBUS protocol is designed to communicate all other Draeger devices and is also used by many major Monitoring and Data management systems.

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Q 4. How can I print out data from the ventilator?

A 4. The data protocol for a printer is based on a HP 500 data format. It is been sent out via the internal serial RS 232 Interface Com1. Some of the newer commercial printer models don't have the serial Port build in any longer so a serial/parallel converter has to be connected.

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Q 5. What could effect the R, C measurements during ventilation?

A 5. Three conditions which can effect the R, C measurement:
1. No valid flow or pressure signal
2. Expiration continuously shorter than 120ms
3. Invalid Software verification
The leak compensated flow signal is used for the R, C calculation.
Two dashes will be displayed for 30 second, if second measurement is no successful.
During this measurement period the last values will be displayed.
R,C values upper limits :
Adult: C < 300; R < 100;
Ped.: C < 60; R < 300;
Neo.: C < 12; R < 600

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Q 6. How does the R, C measurement during ventilation work?

A 6. The R, C, calculation takes measurements of Flow and Paw at three different times during a cycle.
1. just before start of expiration
2. 100 ms after expiration starts
3. after ¾ of the experienced previous expiatory time

Blanks instead of measurements will be shown for example if the patient triggers an inspiration before the third measured value is taken (3/4 of last expiration) or when the calculated values are out of a certain range. The latest software versions do not require a flow = zero condition (plateau) at the end of inspiration. In the pediatric mode however, it is not always easy to get a reliable calculation, due to already small flow signals and leakage's on top of that. Also if pediatric patients have a very stiff lung that creates only a flow spike during expiration, and it is difficult to get good values. Under these conditions it might be that the calculated values are out of the specified range (e.g. Zero or negative compliance) and Evita 2 dura will just show blanks.

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Q 7. What is the performance of the Evita gas delivery system?

A 7. Enhanced HPSV performance from 3 mL, up to 180 L/min allows excellent breathing support. Less WOB, modified PEEP control, and leakage compensation; the Patient valve is easy to handle; the Flow sensor is reliable & reusable; O2 Sensor integrated; Nebulizer performance extended to 30 min. Switch over valve technology (AIR < >O2). The insp. block prepared for future measurements like Paux.

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Q 8. How does the gas delivery system work and how precise is it?

A 8. The gas delivery system is an Electro dynamic valve with less than 1.5 ms response time. A ruby/ball valve allows precise Flow controls between 0 - 180 lpm.

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Q 9. Why is the pressure setting above PEEP?

A 9. Since SW 2.n the Pinsp. setting is an absolute value to allow better and easier control of the total pressure applied to the patient.

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Q 10. How does the Flow measurement work in principle?

A 10. The Flow measurement is based on a hot wire principle where a gas flow is cooling down the hot wires and changing the electrical resistance. This principle is known as pretty accurate and responsive especial in lower flow ranges. Superheating the wires

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and auto calibrating the sensor could clean deposits like condensed water or aerosols.

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Q 11. What potentially effects the lifetime of the Flowsensor?

A 11. Do not autoclave the Flowsensor this will make the sensor unusable. The Flowsensor could be treated like a semi disposable and could be cleaned in an alcohol bath and should be air-dried. Do not expose to an extreme airflow (air gun) to avoid damages of the wires. Some respiratory treatments tend to create deposits on the wire and could be cleaned by the calibration process. Some of these medications are known to be very adhesive or create complete coverage, which could make a re-calibration impossible. A Flowsensor that could not be calibrated any longer should be replaced.

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Q 12. What is the added dead space volume of the CO2 cuvette?

A 12. The CO2 mainstream sensor has a small lightweight curvett close to the Y piece, which adds a small dead space volume to the system.
The added dead space for the
Adult size curvette (8470279) is about 4 ml, for the
Pediatric size curvette (8470280) is about 1.5 ml

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Q 13. How could I prevent bad CO2 measurement signals?

A 13. The measurement principle of the CO2 measurement is based on a IR light absorption principle. The curvette should only be used in a upright position to prevent condensed water to effect the measurement signal negativly

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Q 14. Does my monitoring system communicate with the Evita?

A 14. Basically yes, because Draeger cooperates with most major monitoring companies to implement the MEDIBUS data protocol for standardized communication between the different medical devices. Interface communication exists already with Hewlett Packard, Marquette and others. If your monitoring system doesn't have this update yet please contact the manufacture for details.

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Q 15. Interfacing with Hewlett Packard Monitoring

A 15. The COM Interface setting for the HP - Evita communication should be:
Protocol: MEDIBUS 4.0;
Rate 19200 Baud;
Format: 8 bit, 1 stop bit,
Parity: even

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Hewlett Packard announced a communication Module VueLink update to communicate with the Evita 4/2 dura SW version SW 3.n for Oct.'99.

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Q 16. Why do I sometimes see more rainout effects in the patient system and sometimes less?

A 16. Usually the rainout phenomenon is depending on the temperature conditions and humidification rate during ventilation. The expired gas on body temperature (37.0 C /98.6 F) and fully saturated contains at least 44 mg/l water. If the temperature of the gas drops to ambient temperature the exhaled gas could not hold so much water and some would rain out. If the ambient temperature is at 20 C/68 F the max capacity is reduced to 17.5 mg/l which means that 26.5 mg/l water are rained out and has to be physically collected in the exhalation limb. The exhalation valve is heated by an electrical heating beneath the housing to bring up the gas temperature and prevent condensation inside the valve.

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Q 17. How could I reduce the rainout effect in the patient circuit?

A 17. Principally there are two strategies to prevent negative effects on the ventilation situation. Either by collecting the rainout in in-line water traps or maintains the temperature level above the body temperature within the entire exhalation limb. Double heated wire systems should be able to maintain a temperature level of approx. 5 to 7 C/ 41 to 44 F above body temperature through the limb. In order to minimize fighting of room AC with heated wire systems do not expose the exhalation limb to a cool airflow.

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Q 18. How does the Nebulizer Flow affect the ventilation?

A 18. The Nebulizer flow is compensated by the gas delivery system when the integrated nebulizer port is used and the effective Nebulizer Flow is 6 L/min. In Adult Mode the Nebulizer flow is synchronized to the inspiration phase. In pediatric and neonatal Mode it is switched to continuos nebulization whit a 15 L/min base flow. 9 L/min are supplied via the insp. connector while 6L/min are supposed to be applied via the Nebulizer itself. Any deviation of the effective nebulizer flow might affect the Flow monitoring and could create flow and volume related alarms.

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Q 19. How will the Evita respond to a leak?

A 19. The difference between the insp. measured minute volume and the expiatory measured minute volume is taken as a leak. Tidal volumes are corrected until the

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detected MV leak doesn't exceed 120% of the measured exsp. MV. A leakage Alarm will be displayed after this point.

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Q 20. Do I have to use exp. Filters and could they have a negative effect to the ventilation?

A 20. Usually exhalation Filters are not required to protect the Flow monitoring from moisture or aerosols. The use of an expiatory filter may be indicated by clinical requirements. If the filter is exposed to humid exhalation gas or aerosols the resistance may increase significantly and could affect the patients breathing comforts. In worst cases a PEEP high alarm could indicate that an expiatory resistance significantly affects the expiration.

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Q 21. How does a device failure message on the display affect the ventilation?

A 21. During Power on test and the entire Ventilation and Standby operation the technical systems of the ventilator are continuously monitored. A device failure message will be displayed in case of a detected deviation. Not every detected device failure message affects ventilation. The Error codes are divided into different groups. For details refer to the Troubleshooting section in the Service Manual. One-time occurrence e.g. internal communication problems between CPU's will be recorded in a technical Logbook to improve technical failure analysis.

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Q 22. Is the breathing system of Evita Latex free?

A 22. The entire breathing system of the Evita ventilator series does not contain any Latex materials.

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Q 23. Does the Evita 4/2 dura gas delivery system compensate ambient pressure fluctuations?

A 23. Yes, applied tidal volume is automatically corrected by the changes of ambient pressure and must not be corrected manually.

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Q 24. Why it is not recommended to use Cell phones next to the medical device?

A 24. There is no known evidence that the use of cellular phones or other radio communication devices had affects on the Evita 4/2 dura. But in the past the department of health in several international countries recommends to ban potential EMI (Electro magnetic interfering) devices like the cell phones in the medical device environment. A FDA Bulletin Vol. 24. Sept. 94 "Electromagnetic interference with Medical devices" could be accessed via the Internet. In reference to the operation manual we recommend not to use wireless or cellular phones within 33 ft (10 m) of

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the equipment. Radio communication may cause malfunction in Electro medical equipment.

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Q 25. Could I get metabolic measurement on ventilator?

A 25. Yes, some metabolic parameters could be measured directly with the ventilator. The CO2 monitoring provides next to the capnogram as data's about dead space ventilation (Vds) and, CO2 production (Vco2).

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Q 26. How does the O2 measurement work in principle?

A 26. The O2 measurement is based on an electrochemical process. When the O2 cell is exposed to an O2 concentration a proportional electrical signal is generated and could be read out. Indifference to many me too products on the market, each Draeger O2 cell has two independent operating channels, which are cross-checked during the measurement to verify the signal. Opening the sealing packaging will reduce shelf lifetime significantly

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Q 27. How does the Flow-trigger work in principle?

A 27. If a patient starts to inhale the gas delivery system immediately will respond to deliver a flow to maintain the set PEEP level. When the flow exceeds the set Flow criteria a mandatory stoke is triggered. That means Flow response from the very first moment.

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Q 28. How is the insp. Flow measured?

A 28. The flow of each gas is measured depending on the orifice of the High Pressure Servo Valves. Once calibrated this inductive method creates a flow proportional signal and does not need re-calibration on a routine base.

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Q 29. Why do I need no proximal pressure sensor in Evita?

A 29. In Evita it is not necessary to have a proximal pressure sensor because there is a pressure sensor on the inspiratory limb as well as on the expiatory limb. In general the response time is depending on the length and compliance of the hose system and is usually faster without an additional proximal pressure line. Negative handling effects are avoided by design.
During the inspiration phase the pressure sensor on the expiratory side measures and vice versa. To avoid misreading due to electronic drifting both sensors were cross-checked during a no flow and could be automatically zeroed.

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Q 30. Do the Evita's comply also with the Canadian electrical safety standards?

A 30. Yes they do. The Evita series complies with the CAN/CSA_C22, 601-1 standard. The allowed measured current leakage in all conditions is less than 300 µA (open ground).

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Q 31. Why do the internal batteries have to be connected to AC Main supply?

A 31. Even if the power is switched "OFF" the batteries are still connected to the inner electronic components. Because of the small leak current losses, the Software interprets the battery as not fully charged any longer, so the message "internal Battery discharged!!!" is created even if the capacity is close to 100 %, unless the device is recharged again. To recharge the Batteries the device has to be connected to a main outlet while switched "ON" or in Standby.

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Q 32. What is the minimal ventilation in Neonatal Mode in order to avoid an apnea alarm?

A 32. Apnea is detected, if either start of inspiration or start of expiration is missing within apnea time interval.
Start of inspiration:
Flow > 0.5 L/min for 32 msec and Volume during this interval > 1 mL.
Start of expiration
Flow > 0.25 L/min for 48 msec and Volume during this interval > 1 mL
Remark: Trigger may be recognized before start of inspiration is detected.

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Q 33. How is the PEEP level is maintained in Neonatal Mode when the Flowsensor is removed or deactivated?

A 33. PEEP control is independent of NeoFlow measurement. PEEP control is established with a PID-controller with the aim to establish PEEP at zero flow.

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Q 34. Does AutoFlow start a new test breath, when pressure support is initiated from a level of zero?

A 34. Yes, AutoFlow will initiate a new test breath whenever Psupp is changed to or from 0 cmH2O. The reason is that the Evita internally considers e.g. SIMV with and without Psupp. to be two separate modes. Whenever the mode is switched, a new initialization procedure is started.

Example: "During SIMV, a change in Psupp level may initiate a new AutoFlow test breath for the SIMV, volume oriented, breath immediately following the change. Curiously this doesn't always happen, just for certain changes. It occurs when Psupp.

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changed from 0 to 6 or 8, but not with a change from 12 to 25".
A test breath is also initiated in reverse fashion when Psupp is switched back to ZERO (OFF).

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Q 35. How does the automated calibration and cleaning process of the hot wire Flowsensor work?

*A 35. If there is already an active "flow-sensor inop" alarm during nebulization, there is no automatic cleaning and calibration. In general, the flow sensor inop alarm occurs, if MVexp differs more than 20% from MVinsp for more than one minute. From SW 3.n the daily auto calibration process, cleaning (heating up) is only performed, if MVexp > 1,1 * MVinsp. Zero-Point-Calibration is always performed at 11:00. To avoid side effects during nebulization the automated cleaning of the wires is performed, if MVexp > 1,2 * MVinsp.*

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Q 36. When might Autoflow not be the best way of ventilation?

A 36. Situations where Autoflow is not indicated can be determined by the limitations of Volume Controlled Modes. ARDS/ALI and other disease states requiring long term healing processes, require a defined pressure control strategy. Current opinions among experts advocate reducing the risk of Barotrauma by regulation of pressure and minimal Volume strategy.

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Q 37. Why is there a loss of airway pressure, both PEAK and MEAN, when a patient breathes a superimposed breath; on top of a mandatory Stroke, with Autoflow “ON”?

A 37. There are various reasons for the loss of airway pressure, both PEAK and MEAN when the Autoflow feature is engaged: Pathophysiologic conditions, such as severe restrictive disease, can create an increase in respiratory drive. This would increase the demand for inspiratory flow, and as the system is drained of flow, airway pressures would drop.
Examples of such disease processes are as follows: ARDS/ALI; SEVERE PULMONARY EDEMA; PNEUMONIA WITH ADVANCED CONSOLIDATION, ADVANCED PULMONARY FIBROSIS; SEVERE SEPSIS; NEUROLOGIC RESPIRATORY CENTER IMPAAIRMENT

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Q 38. What are the reasons you may not achieve the set TIDAL VOLUME, after CIRCUIT disconnection from the patient; initiation of the suction procedure, and patient reconnection, in a three breath period? And why is Patient connection from the STAND-BY FUNCTION sometimes unable to establish the set TIDAL VOLUME, after three breaths have elapsed?

A 38. In the event the suction procedure "TIME OUTS", Or the ventilator is taken out of STAND-BY, for an extended period of time, a "AUTOFLOW" test breath is performed to the ambient environment. This disconnect test breath is interpreted as an infinite compliance (INCREASED OR HIGH COMPLIANCE); and therefore the pressure decrements down presuming tidal volume delivery to the room, not the patient. Multiple breaths are now required, in incremental steps of 3 cm H_2O to retarget to patient compliance, as opposed to the infinite compliance of the room. This accounts for the protracted period of time; to reach the target tidal volume.

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Q 39. What can you do if the TIDAL VOLUME SET is not achieved immediately, in the three-step adaptation algorithm?

A 39. In order to reach the SET – TIDAL VOLUME, the step up is quickly attained by the initiation of another TEST BREATH. Several methods can be applied: CHANGE THE MODE OF VENTILATION eg. CMV to SIMV and back to the original mode. This automatically will initiate a test breath.

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